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Face Morphing using CNN

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Abstract

There are various image evaluation techniques have been invented and generally applied in animation and morphing, there are a few methodologies to spread out these mechanism to handle videos contents, especially real-time warping of an expressive motion frame in the video like a human face. This proposed work presents a system that gives real-time processing of the shape and features of the face of people who are standing in front of a system camera. This system allows the user to influence human face shape factors such as the jaw, chin, nose, mouth; eyes, etc. i.e. the user is allowed to concentrate only on what they require to change about the face and observe the manipulated appearance in real-time. Therefore, instead of posing in front of a real mirror and imagining their appearance, our system allows users to pose in front of a digital "virtual mirror" and visualize themselves in different facial features. Real-time face Morphing technique is used for face images. In our system, we can face morphing on the image in that we make the third face using a combination of the first two faces. Using various face images find out the gender of people like Male or Female and also the age of that person. In this system, we are also going to find out the profession of the person based on their getup i.e. farmer, police. In the proposed system we are going to work with video of different person faces and performing face morphing on that video frame i.e. on face images.

Keywords- *Face Morphing, Open Computer Vision, Image Morphing, Video Morphing.*

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I. INTRODUCTION

Morphing images of one face into another is a challenging task due to the features of faces of different peoples will be different. Morphing is the process of developing a sharp animated transformation from one face image into another. By using morphing we can add visual effects not only to images but also in videos, It can also create a unique animated avatar to show oneself in the online sector. Face swapping is used in many fields including the provision of privacy, video compositing, gaming, and other animation applications. The exact formulation of this problem varies depending on the application, with some goals easier to achieve than others. We are going to work on the face morphing concepts on real-time images of the face. Face morphing concept, gender identification, and age detection system using images. We are also working with morphing concepts on video frames i.e. frames in the video also.

The facial expression change [1], from facial images [3]. The possibility to easily control features of the human face, such as eyes, nose or shape of the face, would have many modern tools such as a real-time special effect editing in video containing a face as well as other multimedia and gaming applications. By cross verifying to drafting special effects on the human faces such as shrinking and bulging in real-time could be useful in many entertainment applications [12], but this method does not allow the user to change a single part of the face. This work presents a system that can overcome this limitation.

The problem to be solved by this work is to present a work with the following characteristics:

1) To take input real-time face image from the open computer vision library of machine learning and image processing. A real-time video sequence is containing the image of the human face and output in the form of the morphed face in real-time.

2) To run in real-time application uses open-CV library functionality with CNN algorithmic solution.

3) This allows the user to change their facial features such as nose, mouth, eyes, etc. and the user can see a controlled face image in real-time.

4) For the real-time accuracy in the Morphable regulations, the model creation process must be completely spontaneous. This feature is to make the system an absolute alternative to current face morphing techniques, especially where an artistically untrained user is concerned.

II. LITERATURE SURVEY

Paul Covington et.al [1] Deep Neural Networks for YouTube Recommendations, describe the system at a high level and focus on the dramatic performance improvements brought by deep learning. This segmentation by the classic two-stage divisor of information retrieval first illustrates the description of the deep candidate generation model and then another ranking model.
Shangfei Wang et.al[2] has been introduced a general framework for video affective content analysis, which includes video content, emotional descriptors.
In this study, the present study is both direct and implicit video emotional content analysis, focusing on direct video emotional content analysis.

Abhishek Tripathi et.al [3] states, EmoWare: A Context-Aware Framework for Personalized Video Recommendation Using Affective Video Sequences' This paper is a personal, emotionally intelligent video recommendation engine that takes advantage of the potential of the above two techniques, proposes emo-ware (emotion recognition)

Carlos a. Gomez-uribe et.al [4] proposed This article discusses the various algorithms that make up the Netflix recommender system and describes its commercial purpose and explains the motivations behind it and reviews the approach that we use to enhance the recommendation algorithms.

Daniel McDuff et.al [5] state this subset consists of 242 facial videos (168,359 frames) recorded in real-world conditions. They took a deep survey of their data within their team which helped in finding three problems with their experience and their solutions. A group of viewers additionally gave consent for their data to be shared publicly with other researchers.

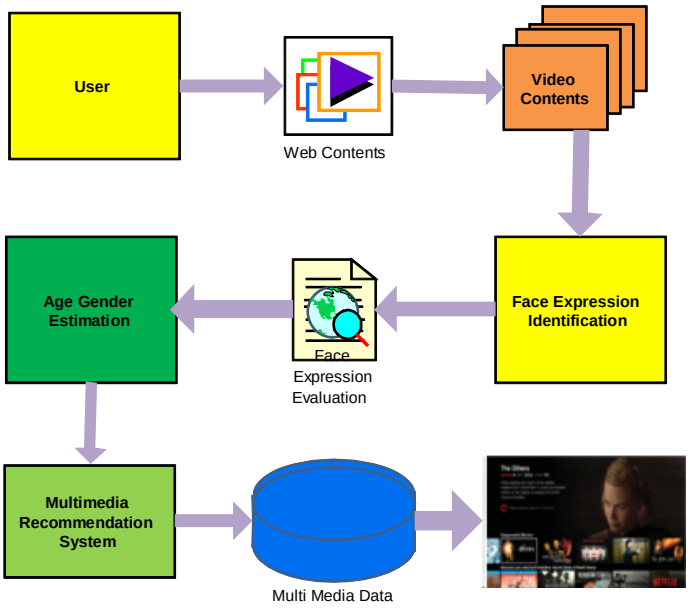


Figure 1.System Architecture

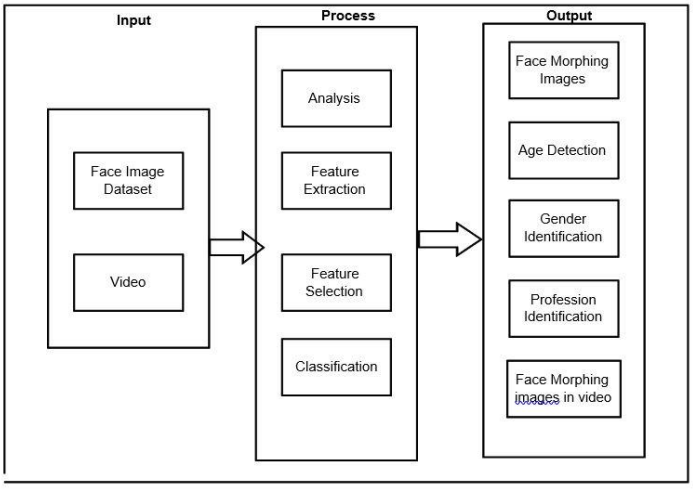


Figure 2 Block Diagram of System

III.METHODOLOGY USED IN PROPOSED SYSTEM

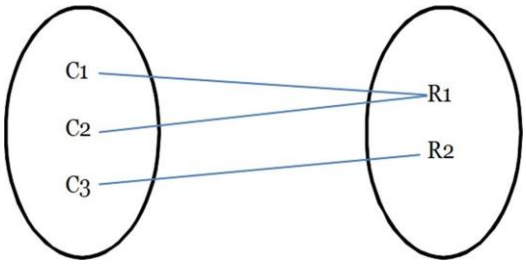
In a this system, we are proposing real-time facial images of two different persons by using open computer vision. In proposed system consist of mainly following modules face morphing Face has been used as one of the mainstream manners for user identification. It takes only a few seconds to change the faces between two facial images But Such swapped images can be improperly used or carelessly used as the Popularity of face-swapping applications is increasing day by day Security is also a major issue. In our system we developed Face morphing by using face images, Gender Identification using face images, Age Detection using face images face morphing concepts on video con by using images.

Mathematical Model

Process

- Let us consider S as a system for “Face Morphing Using CNN”
- C1=facial recognition
- C2= Age estimation
- C3= Gender classification
- R1: Result of face morphing result
- R2: Result of content recommendation

Mathematical Model



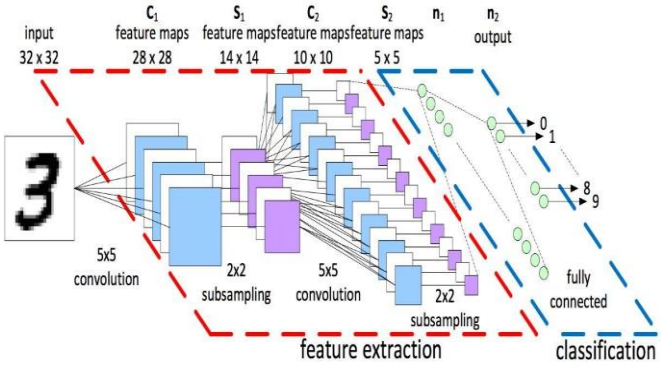


Figure CNN achitecture

S={I,F,O}

INPUT:

F=F1,F2,F3...FN Function to execute result

I=C1,C2,C3... input of real time face morphing

O=R1,R2.... Rn

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I=result access by User

- C1=facial morphing
- C2= Age estimation
- C3= Gender classification
- F: F1=image processing applied on real time faces
- F2=feature extraction from images
- O: R1= Face morphing of images
- R2= Gender identification
- Above mathematical model is NP-Complete.

1. Convolutional neuronal networks (CNN Methodology)

CNN is composed of two major parts:

Feature Extraction**:**

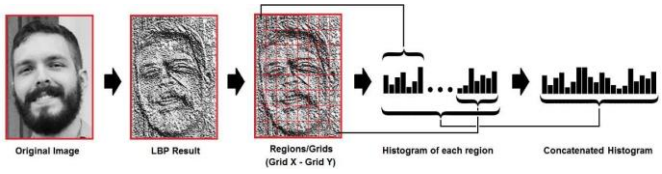
In this part, the network will perform a series of convolutions and pooling operations during which the features are detected. If you had a picture of a zebra, this is the part where the network would recognize its stripes, two ears, and four legs.

Classification**:**

Here, the fully connected layers will serve as a classifier on top of these extracted features. They will assign a probability for the object on the image being what the algorithm predicts it is.

2. Local Binary Pattern (LBP Methodology)

The first computational step of the LBPH is to create an intermediate image that describes the original image in a better way, by highlighting the facial characteristics. To do so, the algorithm uses a concept of a sliding window, based on the parameters **radius** and **neighbors**.



We can use various approaches to compare the histograms (calculate the distance between two histograms), for example: **euclidean distance**, **chi-square**, **absolute value**, etc. In this example, we can use the Euclidean distance (which is quite known) based on the following formula:

$$D = \sqrt{\sum_{i=1}^{n}(hist1_i - hist2_i)^2}$$

IV. EXPERIMENTATION AND RESULTS

The following modules are built in this project:

1. **Face Image Acquisition:-** Using an open computer vision library. We are going to capture real-time face images of different persons. After getting faces we are forwarding these images for feature extraction and image processing.
2. **Image processing:-** After getting face images by using frontal face XML only faces get cropped and further used to process or deform.
3. **Feature Extraction:-** Facial feature extraction is very much important for the initialization of processing techniques like face detection, facial expression recognition, and face recognition. Facial feature extraction is the step of getting face component features like eyes, nose, mouth, etc from real-time face images. Among all facial features, eye localization and detection is

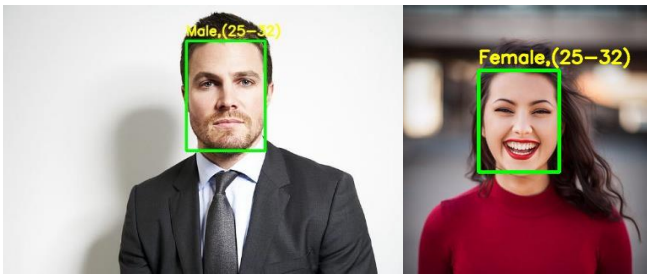
   essential, from which locations of all other facial features are identified.

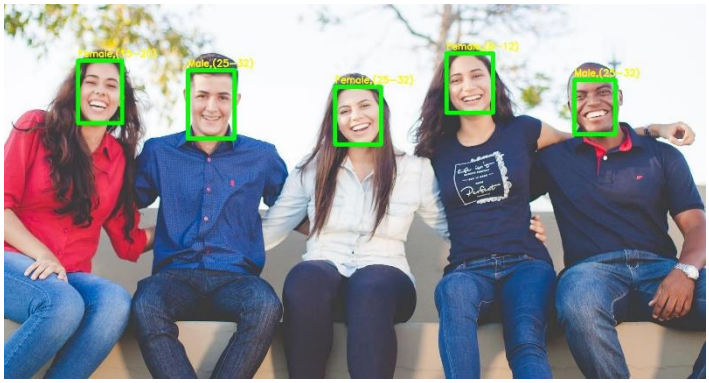
4. **Age Gender Identification:-** The Gender Prediction as a classification problem. The output layer in the gender prediction network is of type softmax with 2 nodes indicating the two classes "Male" and "Female". Age Prediction requires a numeric output hence we have to introduce it as a Regression problem. However, estimating age correctly using regression is challenging. Even humans cannot accurately predict the age based on looking at a person.
5. **Face Morphing:-** In a proposed system, we are going to overcome existing drawbacks maintain spatial and temporal coherence by inventing automated face warping/morphing techniques each have their own respective weaknesses. And provide features video acquisition by using open-cv python. Video and image processing will be done through algorithms and methods. Facial and age estimation did through inception modules created in tensor flow python.

   Failures:

   - Huge database can lead to more time consumption to get the information.
   - Hardware failure.
   - Software failure.

   Acquired Results for AGE GENDER Identification





Expected Result for Face Morphing

CONCLUSION AND FUTURE WORK

Here we have developed Age-Gender identification software which is first part of this project, We are going to develop a real-time face morphing framework based on deep neural networks. We are going to introduce realistic face images as output after transforming face-morphing techniques with our deep neural network. The proposed method deals with a specific type of face replacement. While there are certainly still some issues to overcome, we feel we made important progress on the challenging limitations of neural-network depends on face morphing.

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